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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,986	12/06/2004	Joseph B. Kejha	1391P	7127

7590 11/03/2009

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7746 101 ST. COURT
VERO BEACH, FL 32967-2871

EXAMINER	
BEST, ZACHARY P	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
11/03/2009	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/516,986
Filing Date: December 06, 2004
Appellant(s): KEJHA ET AL.

Zachary T. Wobensmith, III
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed July 31, 2009 appealing from the Office action mailed September 16, 2008.

I. Real Party In Interest

A statement identifying the real party in interest is contained in the brief.

II. Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have bearing on the decision in the pending appeal is contained in the brief.

III. Status of Claims

The statement of the status of claims contained in the brief is incorrect. Claim 22 is rejected under 103(a). Claims 5-7 and 24 is unpatentable over Aihara et al. in view of Hikmet, Gozdz et al., Shibuya et al., and Yun et al.

IV. Status of Amendments

Appellant's statement of the status of amendments after final rejection contained in the brief is correct.

V. Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

VI. Grounds of Rejection To Be Reviewed By Appeal

Appellant's statement of the grounds of rejection in the brief is correct.

VII. Claims Appendix

The copy of the appealed claims contained the Appendix to the brief is correct.

VIII. Evidence Relied Upon

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

Number	Name	Date
US 6,387,565 B1	Aihara et al.	May 14, 2002
US 6,558,840 B1	Hikmet	May 6, 2003
US 5,554,459 A	Gozdz et al.	Sep. 10, 1996
US 6,291,098 B1	Shibuya et al.	Sep. 18, 2001
US 7,279,251 B1	Yun et al.	Oct. 9, 2007
US 2002/0110732 A1	Coustier et al.	Aug. 15, 2002

IX. Grounds of Objection

1. Claims 20 is objected to because the using the ranges given, the mixture will amount to a sum greater than 100 wt. % when using the maximum amount of one component and the minimum amounts of the remaining components. For example, in Claim 20 if the dimethoxyethane is set to the maximum claimed amount (95 wt.%), polyvinylidene

fluoride/hexafluoropropylene is set to the minimum claimed amount (5 wt.%), and the lithium based electrolyte is set to the minimum claimed amount (10 wt.%), then the mixture will weigh 110 wt%. Appropriate correction is required.

X. Grounds of Rejection

1. Claims 2, 4, 9-10, 12-17, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. (US 6,387,565 B1) in view of Hikmet (US 6,558,840 B1), Gozdz et al. (US 5,554,459 A), and Shibuya et al. (US 6,291,098 B1).

Regarding Claim 22, Aihara et al. teach a lithium based electrochemical device comprising two electrodes (col. 6, line 57 – col. 7, line 18), which are porous (col. 4, lines 26-37), said electrodes including current collectors the active materials with binders coated thereon (col. 6, line 57 to col. 7, line 3), at least one separator between said electrodes (Aihara et al. claim 1), said separator having one side in bonding contact with said first electrode active material (Aihara et al. claim 1), an organic ion-conductive adhesive layer on the other side of said separator in adherent contact with said separator and said other electrode (Aihara et al. claim 1), a non-aqueous electrolyte in contact with said electrodes and said separator (Aihara et al. claim 1), and an enclosure surrounding and containing said device (col. 1, lines 39-45). However, Aihara et al. fail to specifically teach the current collectors comprise expanded metal microgrids, the separator is a porous ceramic separator, or the enclosure is a moisture-proof enclosure with exiting sealed terminals extending therefrom.

Hikmet teaches a porous ceramic separator (col. 1, lines 49-65) containing electrically insulating particles and a binder (col. 3, lines 45-55) for a lithium battery (col. 2, lines 61-62), wherein it is advantageous to use said ceramic separator because it is not susceptible to crack-formation and disintegration (col. 1, lines 44-47). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the porous ceramic separator of Hikmet because said ceramic separator is not susceptible to crack-formation and disintegration.

Gozdz et al. teach an electrically-conductive collector element (current collector) for use in a lithium battery (abstract) wherein the current collector is a foil (12 or 16), preferably an expanded metal microgrid (col. 3, lines 1-6), wherein it is advantageous to use said current collector because it maintains the integrity of a strong physical electrically-conductive bond (col. 1, lines 52-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the expanded metal microgrid of Gozdz et al. because said expanded metal microgrid the integrity of a strong physical electrically-conductive bond.

Shibuya et al. teaches a moisture proof enclosure (4) surrounding and containing a lithium electrochemical cell (see col. 7, lines 42-45) with exiting sealed terminals (5 and 6) extending thereform (fig. 3), wherein it is advantageous to use said enclosure because of the superior air-tightness and mechanical strength (col. 1, lines 58-60). Therefore, it would have

been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the enclosure of Shibuya et al. because enclosure has superior air-tightness and mechanical strength.

Regarding Claim 2, Aihara et al. teach said electrodes are an anode and a cathode (Aihara et al. claim 1).

Regarding Claim 4, Hikmet teach said particles are alumina particles (col. 2, lines 35-42).

Regarding Claim 9, Aihara et al. teach said adhesive is PVDF homopolymer (col. 6, lines 6-17) based and contains at least one aprotic liquid (N-methylpyrrolidone, col. 7, lines 54-59) and at least one salt (col. 5, lines 33-38). N-methylpyrrolidone is an aprotic organic solvent as evidenced by Chen et al. (U.S. Patent No. 5,741,609 A, col. 4. lines 25-33).

Regarding Claim 10, Hikmet teaches the electrolyte for a lithium battery comprising ethylene carbonate and diethyl carbonate in equal proportions (col. 4, line 2). It is Examiner's position that the electrolyte of Hikmet has a high boiling point and is essentially non-flammable.

Regarding Claim 12, Aihara et al. teach the separator binder is of a different polymer than electrodes' binders (col. 7, lines 1-5, electrode binder is PVDF, separator binder is PP/PE/PP).

Regarding Claims 13-16, in view that the combined teaching provides for the claimed elements it is reasoned that the elements are capable of acting as a bi-cell, capacitor, supercapacitor, or double layer capacitor.

Regarding Claim 17, Aihara et al. teach that at least one electrode is smaller than said separator (col. 7, lines 11-14).

Regarding Claim 21, Aihara et al. teach that said separator is coated with an adhesive that is a mixture of polyvinylidene fluoride in a range of 5-10 wt.% (col. 7, lines 54-59 and col. 8, lines 27-32).

Regarding Claim 23, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach the electrochemical device as stated above. It is noted that Claim 23 is a product-by-process claim. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985). The battery taught by et al. in view of Hikmet, Gozdz et al., and Shibuya et al. is obvious to that of Applicant's, and therefore, Applicant's process is not given patentable weight in this claim.

2. Claims 5-7 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. as applied to Claims 2, 4, 9-10, 12-17, 21-23 above, and in further view of Yun et al. (US 7,279,251 B1).

Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach a lithium-based electrochemical device as recited above. However, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. fail to teach a separator containing fluoride particles.

Regarding Claim 5, Yun et al. teach a secondary battery with a separator comprising inorganic lithium fluoride particles (col. 4, lines 20-25). Yun et al. teach it is advantageous to add a filling agent to a separator because of improved porosity and mechanical strength (col. 4, lines 18-20). Yun et al. further teach the functional equivalency of the addition of either LiF or Al_2O_3 to the separator (col. 4, lines 18-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the electrochemical device of Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. with a porous ceramic separator comprising inorganic lithium fluoride particles because Yun et al. teach resultant improved porosity and mechanical strength of the separator. Alternatively, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute lithium fluoride for alumina in the electrochemical device of Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. because Yun et al. teach functional equivalency of the particles as inorganic filler in a separator.

Regarding Claim 6, Yun et al. teach a separator comprising inorganic fluoride particles (col. 4, lines 20-25).

Regarding Claim 7, Yun et al. teach a separator comprising inorganic fluoride and alumina particles (col. 4, lines 20-25).

Regarding Claim 24, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach the electrochemical device as stated above. It is noted that Claim 23 is a product-by-process claim. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985). The battery taught by Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. in view of Yun et al. is obvious to that of Applicant's, and therefore, Applicant's process is not given patentable weight in this claim.

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. as applied to Claims 2, 4, 9-10, 12-17, 21-23 above, and in further view of Coustier et al (US 2002/0110732 A1).

Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach an electrochemical device as recited in paragraph 11 above. However, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. et al. fail to teach said adhesive is a PVDF/HFP copolymer.

Coustier et al. teach an electrochemical cell having a binder (adhesive, 105) to enhance the bonding of the electrochemical cell's components to each other (par. 23), and Coustier et al. further teach the functional equivalency of PVDF and PVDF/HFP (colpar. 28) for us as said binder (adhesive). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the electrochemical device as taught by Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. wherein

the PVDF/HFP is substituted for PVDF as a base for the adhesive because Coustier et al. teach the functional equivalency of PVDF homopolymer and PVDF/HFP copolymer for use as an adhesive material in an electrochemical cell.

XI. Response to Arguments

1. Applicants argue that none of the cited patents remotely suggest the combinations proposed by Examiner.

Applicant attempts to differentiate the instant invention from the combination of the cited prior art by individually examining each reference in separation where the rejection. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The rejection of independent Claim 22, and subsequent dependent claims, is based on a combination of the prior art.

The four references rejecting independent Claim 22 all pertain to inventions and art relating to lithium batteries. Aihara et al., the primary reference is cited as a baseline lithium battery including the key feature of an adhesive resin between the separator the electrode (Aihara et al., claim 1).

Aihara et al. gives only one example of the materials used for a separator in an embodiment where the separator is a three-layered polypropylene/ polyethylene/ polypropylene separator (Aihara et al., col. 7, lines 4-6) containing an organic electrolyte

containing lithium ions (Aihara et al., claims 1-2). Aihara et al. does not teach a ceramic separator. Hikmet teaches a porous ceramic separator for use in lithium batteries (Hikmet, col. 1, lines 49-54 and col. 2, lines 61-62), wherein it is advantageous to use said ceramic separator because it is not susceptible to crack-formation and disintegration (Hikmet, col. 1, lines 44-47). Hikmet also teaches that the separator will contain an organic electrolyte containing lithium ions (Hikmet, col. 4, lines 1-2). Therefore, there is sufficient motivation to substitute the separator of Aihara et al. with the porous ceramic separator of Hikmet.

Aihara et al. gives one example of a current collector in an embodiment where the current collector is an aluminum foil substrate (Aihara et al., col. 6, line 63). Aihara et al. does not teach an expanded metal microgrid collector. Gozdz et al. teach a lithium battery (Gozdz et al., col. 1, lines 53-60) comprising aluminum collector foil, which may be an expanded metal microgrid (Gozdz et al., col. 3, lines 2-6) which are advantageous to use because it maintains the integrity of a strong physical electrically-conductive bond (Gozdz et al., col. 1, lines 52-60) and is suitable in providing pathways for solvent pentration (Gozdz et al., col. 2, lines 5-6). Therefore, there is sufficient motivation to substitute the aluminum foil current collector of Aihara et al. with the expanded metal microgrid of Gozdz et al. Although not applied as a teaching reference to the current collector, it is noted that Hikmet also teaches use of an alminum current collector (Hikmet, col. 3, lines 57-58).

Aihara et al. teach that the electrode body is placed in a bag, which is sealed (col. 7, lines 23-30). Aihara et al. does not teach said bag (enclosure) is moisture proof with sealed terminal extending therefrom. Shibuya et al. teach a moisture proof enclosure (figure 3,

element 4) surrounding and containing a lithium battery (col. 7, lines 48-51) with exiting sealed terminals (figure 3, elements 5 and 6), wherein it is advantageous to use said enclosure because of the superior air-tightness and mechanical strength (col. 1, lines 58-60). Therefore, there is sufficient motivation to substitute the bag of Aihara et al. with the moisture proof enclosure of Shibuya et al.

Therefore, each and every claim limitation of independent Claim 22 is obvious to that of the prior art. The rejections of the dependent claims are based on independent Claim 22, and are similarly proper.

XII. Related Proceedings Appendix

None.

For the above reasons, it is believed that all the rejections should be sustained.

Respectfully Submitted,

/Zachary Best/
Examiner, Art Unit 1795

Conferee

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